

Opportunistic immunisation in hospital

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Abstract

Aim—To assess the potential for administering catch up and scheduled immunisations during hospital admission.

Methods—Immunisation status according to the child's principal carer was checked against official records for 1000 consecutively admitted preschool age children. Junior doctors were instructed to offer appropriate vaccination before discharge, and consultants were asked to reinforce this proactive policy on ward rounds.

Results—Excluding those children who were not fully immunised against pertussis through parental choice, 142 children (14.2%) had missed an age appropriate immunisation and 41 were due a scheduled immunisation. None had a valid contraindication. Only 43 children were offered vaccination on the ward but uptake was 65% in this group.

Conclusions—Admission to hospital provides opportunities for catch up and routine immunisations and can contribute to the health care of an often disadvantaged group of children. These opportunities are frequently missed. Junior doctors must be encouraged to see opportunistic immunisation as an important part of their routine work.

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Immunisation of children against infectious diseases that, at one time, routinely killed and maimed is a most effective health care intervention,¹ but vaccination uptake in preschool children falls below the target of 95%. Missed opportunities are significant contributors to this shortfall. Each contact between children and health care professionals should be seen as an opportunity to immunise. Paediatric inpatients are a particularly vulnerable group and at risk of under immunisation. An essential part of the infrastructure necessary for effective opportunistic immunisation of inpatients exists with ready access to accurate personal immunisation histories available for most children in their child health records or through the health authority computer database. Admission to hospital allows time to use these to confirm an immunisation history taken from the child's attendants. Immunisation can be offered if appropriate and administered before discharge. The chance to protect susceptible children is there and we have been exhorted to take it.^{2 3} Nonetheless, screening of paediatric admissions for an accurate immunisation history is far from routine. Nor does this

appear to be seen as a high priority by either consultants or paediatricians in training on whose enthusiasm the success or failure of immunisation in hospital inpatients depends.

Our study had two aims. The first was to assess the true extent of the opportunity to administer catch up or due immunisations to preschool age admissions, following the recent government sponsored campaigns to increase immunisation uptake and the introduction of general practitioner reward schemes for targets achieved. Our second aim was to assess the success of an opportunistic immunisation policy.

Method

The carers of 1000 consecutive preschool age children admitted to a paediatric ward were asked by the attending doctor about the immunisation status of their child. This was checked against the child health record book if available, or by telephone contact with the health authority computer database. The latter became routine work for the ward clerk. Where there was a conflict of information, the official record was taken as accurate unless cogent explanations were given for the discrepancy. Reasons for missed immunisations were sought and documented. The ward doctor was instructed to discuss immunisation with the family of any under immunised child and to offer appropriate immunisation on the ward before discharge. Consultants and middle grade staff were asked to emphasise the proactive nature of this policy on ward rounds. When available, reasons for carers refusing catch up immunisation were noted.

Results

Immunisation status was ascertained for 1000 children, mean age 1.5 years. Seven hundred and ninety eight (80%) had been immunised at the appropriate age. Nineteen children were not protected against pertussis because of parental anxieties about the safety of the vaccine (16 cases) or because of a presumed reaction against the first or second pertussis vaccination (three cases). Forty one (4.1%) had missed a scheduled immunisation because of their acute illness, or were due a scheduled immunisation shortly after discharge. One hundred and forty two (14.2%) had missed an age appropriate immunisation. Reasons for missed immunisations are given in table 1. None was a valid contraindication. The age distribution of the under immunised children was as follows: first immunisation, median age 5 months (range 3-42 months); second immunisation, median age 6 months (range 4-35 months); third immunisation, median age 8 months (range 5-36 months); first measles-

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Table 1 Reasons for missed scheduled immunisations (*n* = 142)

Number missed	Reason
77	None obtained
38	Ill at the time*
10	No reminder received
8	Unsure if vaccine received or not
2	Previous "reaction" in family member
7	Miscellaneous excuses

*Mostly upper respiratory tract infection or diarrhoea.

mumps-rubella (MMR), median age 20 months (range 16–66 months); second MMR, median age 58 months (range 55–66 months).

For 49 (5%) children no computer or child health record was available because of family mobility. There were differences between the child's immunisation status as reported by the carers and the official record in 90 (9.5%) of the remaining 951 admissions. In 44 (49%) cases the mother reported more vaccinations received than officially recorded, while in 20 (22%) cases fewer vaccinations were reported by the mother than officially recorded. In 14 (16%) cases no record was obtained from the family because they could not remember (five cases) or because they were not available to ask. In 12 (13%) cases there was no record of recent immunisations on the computer database but it was believed reasonable to attribute this to acceptable administrative delay.

Forty three (23%) of the 183 children who were due an immunisation or were under immunised were offered immunisation on the ward. Twenty eight (65%) accepted, 26 receiving diphtheria, tetanus, pertussis, Hib, and oral poliomyelitis, and one receiving MMR. Twenty (71%) of these 27 children were brought fully up to date with their immunisations. Of the 15 carers who refused immunisation on the ward, 10 preferred to have this done by their general practitioner after discharge, three felt that their child was still not well enough, one remained concerned about vaccine safety, and in one case no reason was documented. In none of the other 140 children did the junior ward doctor document that appropriate vaccination was deferred because of continuing signs or symptoms of acute illness at discharge.

Discussion

Immunisation is effective preventive medicine.¹ Infectious diseases can be eliminated when the susceptible population is reduced below a critical number so that each primary case fails to produce at least one secondary case. It is estimated that this can be achieved for measles, mumps, pertussis, and rubella when immunisation uptake is between 92–96%.⁴ Across the world we fail to realise these levels, especially in inner city areas where age appropriate immunisation may only be achieved in 40–60% of two year olds.^{5–9} This under immunised cohort remains a reservoir for infectious diseases in the community and has been shown to play a significant role in mini-epidemics of measles in the USA.^{6 10–12} These children are also the most likely to suffer complications.¹¹ The World Health Organisation set a target of 90% uptake for the primary immunisation schedule in pre-

school children in 1984 as a prerequisite to the elimination of indigenous measles, poliomyelitis, diphtheria, and congenital rubella.¹³ In 1992 a target of 95% was set for England.¹⁴

Preschool children require three diphtheria, tetanus, pertussis, Hib and oral poliomyelitis immunisations in the first four months, one MMR at 12–15 months, and diphtheria, tetanus, poliomyelitis and MMR boosters three years after completion of the primary course to meet the recommended UK schedule. Reasons for under immunisation are many and complex, ranging through professional health carers misunderstanding of what constitutes a valid contraindication, to organisational problems reducing opportunities, to parental fears of vaccine side effects, often inflamed by unbalanced media reports. In Ehresmann's study of kindergarten age Minnesota preschoolers in the USA, as each additional immunisation due date was reached the percentage of children behind the recommended schedule increased—for example, from 21% at 12 months, to 55% at 16 months, then to 64% at 19 months.⁹ Similarly in the UK, compliance with the national immunisation schedule can fall below 50% by the time a child reaches 5 years of age.¹⁵ The UK Cover/Korner data for the northern and Yorkshire region in the final quarter of 1995 showed overall uptake at 95% or above at 24 months of age for only diphtheria, tetanus, poliomyelitis, and Hib and there were important differences between districts. Leeds fell below 95% for all vaccines. In the first quarter of 1998 overall coverage for the northern and Yorkshire region was still below the target for pertussis and MMR vaccines, and Leeds was still not achieving 95% uptake for any part of the immunisation programme. Similar deficiencies occur elsewhere. Despite some success in achieving catch up immunisation between the first and second birthday in Tameside and Glossop, 11% of two year olds remained incompletely immunised.¹⁵

Particularly vulnerable groups of children have been identified. The use of preventive medical opportunities varies greatly between the "haves" and "have nots" throughout our society.^{16 17} In areas of social deprivation immunisation may be rated as less important than in higher socioeconomic status groups.^{18 19} Immunisation uptake is lower for children from mobile families and for those of single and poorly educated mothers who may find access to services more difficult, especially for children lower in the birth order in large families.^{6 7 9 11 20–23} These families may suffer particularly from an appointment only system and long waiting times in clinics. In the USA age appropriate immunisation is more complete in white than black or hispanic preschool age children²⁴ and similar discrimination may exist in the UK.

We must alter our concept of immunisation as events that occur at discrete points in time and see it as a continuum.⁹ We must educate junior doctors and medical students to see each contact between children and the health care system as an opportunity to review their

immunisation status and update where indicated with all the vaccines for which the children are eligible.^{25 26} Missed opportunities to immunise are a major reason for the continuing under immunisation of vulnerable children.^{6 8 11 12 27 28} Accident and emergency visits should ideally be used to increase immunisation uptake but have inherent logistic difficulties—for example, staffing levels, finding time to confirm given immunisation status. Vaccinating at well-child care visits alone is unlikely to make sufficient impact.²⁹ Barriers to immunisation in the community—for example, appointments, access, waiting times—do not exist in hospital, and the admission process provides time to take an immunisation history and verify this against official records.

Immunisation histories obtained from carers are not reliable. We found that where there were discrepancies between the mother's recollection of the vaccination history and the official records, in 49% of cases the former overestimated the number of vaccinations received and in a further 16% no immunisation history had been given. Others have found a similar degree of inaccuracy in parental memory.^{5 7 30} However, like others we found that with commitment accurate information can be obtained for most admissions from personal child health records and the local computer database without disrupting daily work.^{30 31} Even if not available at admission the former can be requested. Unfortunately, they are often not used by doctors.⁵ Access to health authority records is not difficult,³⁰ but this route to verification of immunisation status is also not routinely used. Bell reported an average of only 1.5 telephone calls to the primary care provider per child to confirm immunisation status in 86% of over 2000 admissions.³² Informative contact with the computer database took only one telephone call and one to two minutes for most patients in our study, a minor addition to routine workload that allowed verification of vaccinations received in 94% of 1000 patients. Nonetheless, casual history taking which will underestimate the number of under immunised children² is common.^{5 7 33}

Immunisation in hospital can make an important contribution to a vulnerable group of children,⁵ but only if it is considered important by all medical staff, and a routine system is introduced for screening and vaccinating.^{2 3 30} We found 142 children who had missed an age appropriate immunisation and a further 41 children who were due a scheduled immunisation in 1000 admissions. None had a valid contraindication to vaccination, and signs and symptoms of the acute illness had resolved. Despite the ongoing study that necessitated accurate documentation of immunisation status, only 43 of 183 eligible children were offered immunisation on our ward, but 28 of these parents accepted and arrangements were made to catch up with immunisations at their general practitioners for a further 10. Others have reported similar possibilities for opportunistic immunisation of hospitalised children and a similar professional disinterest in this

Key messages

- Immunisation status can be obtained without disturbing ward routine
- Hospital admission is a real opportunity for catch up immunisation
- The majority of these immunisation opportunities are missed
- Age appropriate immunisation of inpatients should become routine procedure

most effective form of preventive medicine.^{7 30 32 33} Little progress has been made over the last decade. Bell increased the percentage of fully immunised children from 44% on admission to 70% at discharge, but only by creating a specialised infrastructure including an immunisation team consisting of doctor, nurse coordinator, and assistant.³² Junior doctors must be convinced of the efficacy and importance of the childhood immunisation programme because, although encouragement by senior doctors is essential, the responsibility for offering and administering vaccination must be with the junior staff, with the average length of stay of acute admissions being only two to three days. Better vaccination uptake may be obtained by offering catch up immunisation in outpatient follow up clinics. However, this may overload already stretched outpatient services and committed staff can achieve high immunisation uptake on the ward.^{30 31} One hundred per cent effort by doctors in the context of the 65% acceptance rate found in our study would have resulted in catch up immunisation in 9.2% of the 1000 admissions.

In conclusion we have shown that a large percentage of preschool age children admitted to hospital are under immunised, that accurate immunisation histories can be obtained without disrupting ward routine, and that a large majority of parents accept the offer of catch up immunisation during their child's inpatient stay. Unfortunately our study also confirms that there is a pervasive disinterest in providing this service among doctors in training. As inpatient immunisation is rarely practised, the assumption is that enthusiasm for it is also unlikely to be prevalent among consultant paediatricians. We recommend that the importance of immunising children is emphasised at medical school and in subsequent training, that children's immunisation status is accurately documented at admission from official records and appended to the front of the child's charts, that any under immunisation is highlighted in the acute problem list, that any needed vaccines are given on the day of discharge, and that the general practitioner is fully informed.

- 1 Robbins A. Progress towards vaccines we need and do not have. *Lancet* 1990;335:1436-9.
- 2 Fulginiti VA. Incomplete immunisations, hospitalisation, and specialty care. *Am J Dis Child* 1988;142:704.
- 3 Hull D. Immunising children in hospital. *BMJ* 1988;297:755.
- 4 Anderson RM, May RM. Vaccination and herd immunity to infectious diseases. *Nature* 1985;318:323-9.
- 5 Ferson MJ. Immunisation state and its documentation in hospital patients. *Arch Dis Child* 1990;65:763-7.

- 6 Cutts FT, Orenstein WA, Bernier RH. Causes of low pre-school immunisation coverage in the United States. *Ann Rev Public Health* 1992;13:385-98.
- 7 Kum-Nji P, James D, Herrod HG. Immunisation status of hospitalised pre-school children: risk factors associated with inadequate immunisation. *Pediatrics* 1995;96:434-8.
- 8 Holt E, Guyer B, Hughart N, *et al.* The contribution of missed opportunities to childhood under-immunisation in Baltimore. *Pediatrics* 1996;97:474-80.
- 9 Ehresmann KR, White KE, Hedberg CW, *et al.* A state wide survey of immunisation rates in Minnesota school age children: implication for targeted assessment and prevention strategies. *Pediatr Infect Dis J* 1998;17:711-16.
- 10 Hutchings SS, Escalan J, Markowitz LE, *et al.* Measles outbreak among unvaccination pre-school age children: opportunities missed by health care providers to administer the measles vaccine. *Pediatrics* 1989;83:369-74.
- 11 Orenstein WA, Atkinson W, Mason D, Bernier RH. Barriers to vaccination pre-school children. *J Health Care Poor Underserved* 1990;1:315-30.
- 12 Orenstein WA, Bernier RH. Toward immunising every child on time. *Pediatrics* 1994;94:545-6.
- 13 Begg N, Noah N. Immunisation targets in Europe and Britain. *BMJ* 1985;291:1370-1.
- 14 Department of Health. *The Health of a nation: a strategy for health in England*. London: HMSO, 1992.
- 15 Billsborough J. Measuring compliance with the national immunisation schedule. *Health Trends* 1998;30:56-60.
- 16 Marsh GN, Channing BM. Comparison in use of health services between a deprived and an endowed community. *Arch Dis Child* 1987;62:392-6.
- 17 Williams IT, Milton JD, Farrell JB, Graham NMH. Interaction of socio-economic status and provider practices as predictors of immunisation coverage in Virginia children. *Pediatrics* 1995;96:439-46.
- 18 Jacobson B, Smith A, Whitehead M. *The nations health. A strategy for the 1990s*. A report from an independent multi-disciplinary committee. London: King Edward's Hospital Fund for London, 1991.
- 19 Bennett P, Smith C. Parents attitudes towards immunisation in Wales according to socio-economic group: a preliminary investigation. *Health Educ J* 1992;51:127-31.
- 20 Peckham C, Beford H, Senturia Y, Ades A. *The Peckham report. National immunisation study: factors influencing uptake in children*. Horsham: Action Research for the Crippled Child, 1989.
- 21 New SJ, Senior ML. "I don't believe in needles" qualitative aspects of a study into the uptake of infant immunisation in two English health authorities. *Soc Sci Med* 1991;33:509-18.
- 22 Bobo JK, Gale JL, Thapa PH, Wassilak SGF. Risk factors for delayed immunisation in a random sample of 1163 children from Oregon and Washington. *Pediatrics* 1993;91:308-14.
- 23 Li J, Taylor B. Factors affecting uptake of measles, mumps and rubella immunisations. *BMJ* 1993;307:168-71.
- 24 Centres for Disease Control. Update: measles outbreak—Chicago, 1989. *MMWR* 1990;39:317-19, 325-6.
- 25 Lieu TA, Black SB, Sorel ME, Ray P, Shinefield HR. Would better adherence to guide lines improved childhood immunisation rates? *Pediatrics* 1996;98:1062-8.
- 26 Grabowsky M, Orenstein WA, Marcuse EK. The critical role of provider practices in undervaccination. *Pediatrics* 1996;97:735-7.
- 27 McConnochie KM, Roghmann KJ. Immunisation opportunities missed among urban poor children. *Pediatrics* 1992;89:1019-26.
- 28 Fairbrother G, Friedman S, DuMont KA, Lobach KS. Markers for primary care: missed opportunities to immunise and screen for lead and tuberculosis by private physicians serving large numbers of inner city medicaid-eligible children. *Pediatrics* 1996;97:785-90.
- 29 Szilagyi PG, Rodewald LE, Humiston SG, *et al.* Reducing missed opportunities to immune: easier said than done [abstract]. *Pediatr Res* 1995;37:145A.
- 30 Riley D, Mughal MZ, Roland J. Immunisation state of young children admitted to hospital and effectiveness of a ward based opportunistic immunisation policy. *BMJ* 1991;302:31-3.
- 31 Walterspeil JN, Dishuck JF. Updating immunisation status at discharge. *Am J Dis Child* 1989;143:879-80.
- 32 Bell LM, Pritchard M, Anderko R, Levenson R. A program to immunise hospitalised pre-school aged children: evaluation and impact. *Pediatrics* 1997;100:192-6.
- 33 Tift CJ, Laderman HM. Immunisation status of hospitalised pre-school aged children. The need for hospital based immunisation programs. *Am Dis Child* 1988;142:719-20.